CLAIMS

What is claimed is:

1. An antenna comprising:

a first conductive layer comprising one or more parasitic patches;

a second conductive layer comprising a plurality of radiating patches; and

a third conductive layer comprising a ground patch,

wherein the first, second and third conductive layers are separated by first and second substrate layers.

2. The antenna of claim 1 wherein the second conductive layer comprises:

a first radiating patch having dimensions selected to radiate signals within a first frequency spectrum; and

second radiating patches having dimensions selected to radiate signals within a second frequency spectrum.

3. The antenna of claim 2 wherein the first frequency spectrum is a 5 GHz frequency spectrum and the second frequency spectrum is a 2.4 GHz frequency spectrum, the 2.4 GHz spectrum comprising a frequency band ranging from approximately 2.4 to 2.5 GHz, the 5 GHz frequency spectrum comprising frequency bands from approximately 5.1 to 5.9 GHz.

4. The antenna of claim 1 wherein the one or more parasitic patches are electrically isolated from the second and third conductive layers,

wherein during operation of the antenna, the one or more parasitic patches are to couple energy radiated either to or from the radiating patches.

5. The antenna of claim 2 wherein the plurality of radiating patches are electrically coupled and have a single feeding point electrically coupling the radiating patches to a feed conductor provided through the second substrate layer and through the third conductive layer.

6. The antenna of claim 5 wherein the plurality of radiating patches have one or more grounding points electrically coupling the radiating patches to the third conductive layer by a conductive path provided through the second substrate layer.

7. The antenna of claim 6 wherein the feeding point is located at a first location on the radiating patches and the one or more grounding points are located at second locations on the radiating patches.

8. The antenna of claim 6 wherein a center conductor of a coaxial cable is coupled to the feeding point and an outer conductor of the coaxial cable is coupled to the third conductive layer.

9. The antenna of claim 5 wherein the feed conductor is coupled to a wireless network communication station,

wherein the feed conductor is to receive radio frequency (RF) signals in at least one of the frequency spectrums from the antenna, and

wherein the feed conductor is to provide RF signals in the at least one of the frequency spectrums to the antenna for transmission.

10. The antenna of claim 1 wherein the third conductive layer substantially comprises the ground patch, and

wherein the third conductive layer comprises one or more slots within the ground patch.

11. The antenna of claim 1 wherein the substrate layers comprise an organic substrate material.

12. The antenna of claim 1 wherein the substrate layers comprise an inorganic substrate material.

13. The antenna of claim 3 wherein the 2.4 GHz frequency spectrum comprises a first frequency band ranging from approximately 2.4 to 2.5 GHz, and

wherein the 5 GHz frequency spectrum comprises:

a second frequency band ranging from approximately 5.15-5.35;

a third frequency band ranging from approximately 5.47-5.725; and

a fourth frequency band ranging from approximately 5.727-5.875.

14. The antenna of claim 13 wherein a first of the parasitic patches has dimensions of approximately 3 mm x 3.5 mm,

wherein a second of the parasitic patches has dimensions of approximately 1 mm x 2 mm,

wherein the first radiating patch is substantially rectangular and has dimensions of approximately 3.5 mm x 12 mm,

wherein the second radiating patches are substantially rectangular and have dimensions of approximately 3.5 mm x 12 mm, and

wherein the ground patch has dimensions of approximately 24 mm x 30 mm and has one or more slots therein.

15. The antenna of claim 1 wherein the parasitic patches, the radiating patches and the ground patch are conductive and comprise at least one of gold, copper, tungsten, silver, brass, aluminum or steel, including alloys thereof.

16. A multi-layer, multi-band antenna comprising:

a first conductive layer comprising one or more parasitic patches;

a second conductive layer comprising a plurality of radiating patches;

a third conductive layer comprising a ground patch;

a first substrate layer separating the first and second conductive layers; and

a second substrate layer separating the second and third conductive layers,

wherein the one or more parasitic patches are electrically isolated from the second and third conductive layers, and

wherein the plurality of radiating patches are electrically coupled and have a single feeding point to electrically couple the radiating patches to a feed conductor.

17. The antenna of claim 16 wherein the plurality of radiating patches have one or more grounding points electrically coupling the radiating patches to the third conductive layer by a conductive path provided through the second substrate layer, and

wherein the third conductive layer has one or more slots therein.

18. The antenna of claim 16 wherein the second conductive layer comprises:

a first radiating patch having dimensions selected to radiate signals within a first frequency spectrum; and

second radiating patches having dimensions selected to radiate signals within a second frequency spectrum,

wherein a center conductor of a coaxial cable is coupled to the feeding point and an outer conductor of the coaxial cable is coupled to the third conductive layer, and

wherein the third conductive layer substantially comprises the ground patch.

19. A multi-layer circuit board comprising:

one or more parasitic patches disposed on a first substrate layer;

a plurality of radiating patches disposed on a second substrate layer; and

a ground patch disposed on the second substrate layer on a side opposite the radiating patches,

wherein the one or more parasitic patches are electrically isolated from the radiating patches and the ground patch, and

wherein the plurality of radiating patches are electrically coupled and have a single feeding point to electrically couple the radiating patches to a feed conductor.

20. The circuit board of claim 19 wherein the one or more parasitic patches, the radiating patches and the ground patch comprises a multi-band antenna,

wherein the plurality of radiating patches have one or more grounding points electrically coupling the radiating patches to the ground patch by a conductive path provided through the second substrate layer, and

wherein the ground patch has one or more slots therein.

21. The circuit board of claim 20 wherein the plurality of radiating patches comprises:

a first radiating patch having dimensions selected to radiate signals within a first frequency spectrum; and

second radiating patches having dimensions selected to radiate signals within a second frequency spectrum, and

wherein a center conductor of a coaxial cable is coupled to the feeding point and an outer conductor of the coaxial cable is coupled to the ground patch.

22. The circuit board of claim 21 wherein the multi-band antenna is a first multi-band antenna, and wherein the circuit board further comprises a second multi-band antenna therein, the second multi-band antenna comprising:

second one or more parasitic patches disposed on the first substrate layer;

a second plurality of radiating patches disposed on the second substrate layer; and

a second ground patch disposed on the second substrate layer on a side opposite the second radiating patches.

23. A system comprising:

a transceiver; and

an antenna coupled to the transceiver, the antenna comprising:

a first conductive layer comprising one or more parasitic patches;

a second conductive layer comprising a plurality of radiating patches; and

a third conductive layer comprising a ground patch,

wherein the first, second and third conductive layers are separated by first and second substrate layers.

24. The system of claim 23 wherein the one or more parasitic patches are electrically isolated from the second and third conductive layers,

wherein the plurality of radiating patches are electrically coupled and have a single feeding point to electrically couple the radiating patches to a feed conductor,

wherein the plurality of radiating patches have one or more grounding points electrically coupling the radiating patches to the third conductive layer by a conductive path provided through the second substrate layer, and

wherein the third conductive layer comprises one or more slots therein.

25. The system of claim 24 wherein the second conductive layer comprises:

a first radiating patch having dimensions selected to radiate signals within a first frequency spectrum; and

second radiating patches having dimensions selected to radiate signals within a second frequency spectrum, and

wherein a center conductor of a coaxial cable is coupled to the feeding point and an outer conductor of the coaxial cable is coupled to the third conductive layer, and

wherein the third conductive layer substantially comprises the ground patch.

26. A multi-antenna communication station comprising:

a transceiver to receive and transmit orthogonal frequency division multiplexed signals over a high-throughput communication channel; and

a plurality of antennas, at least some of the antennas comprising:

a first conductive layer comprising one or more parasitic patches;

a second conductive layer comprising a plurality of radiating patches; and

a third conductive layer comprising a ground patch,

wherein the first, second and third conductive layers are separated respectively by first and second substrate layers,

wherein the high-throughput communication channel comprises a combination of either one or more subchannels or one or more spatial channels associated with one or more subchannels, and

wherein each of the at least some of the antennas is to communicate within one of the subchannels or within one of the spatial channels.

27. The communication station of claim 26 wherein for each antenna, the one or more parasitic patches are electrically isolated from the second and third conductive layers and the plurality of radiating patches are electrically coupled and have a single feeding point to electrically couple the radiating patches to a feed conductor,

wherein for each of the antennas, the plurality of radiating patches have one or more grounding points electrically coupling the radiating patches to the third conductive layer by a conductive path provided through the second substrate layer, and

wherein for each of the antennas, wherein the third conductive layer comprises one or more slots therein.

28. The communication station of claim 27 wherein the high-throughput communication channel comprises one of:

a wideband channel having up to four frequency separated subchannels wherein at least one antenna is associated with each subchannel;

a multiple-input-multiple-output (MIMO) channel comprising a single subchannel having up to four spatial channels wherein at least one antenna is associated with each spatial channel; and

a wideband-MIMO channel comprising two or more frequency separated subchannels, each subchannel having two or more spatial channels wherein at least one antenna is associated with each subchannel-spatial channel combination.

29. The communication station of claim 28 wherein for each of the antennas, the second conductive layer comprises:

a first radiating patch having dimensions selected to radiate signals within a first frequency spectrum; and

second radiating patches having dimensions selected to radiate signals within a second frequency spectrum, and

wherein for each antenna, a center conductor of a coaxial cable is coupled to the feeding point and an outer conductor of the coaxial cable is coupled to the third conductive layer, and

wherein for each of the antennas, the third conductive layer substantially comprises the ground patch.

30. The communication station of claim 29 wherein the wideband channel has a wideband channel bandwidth of up to 80 MHz and comprises up to four of the subchannels,

wherein the subchannels are non-overlapping orthogonal frequency division multiplexed channels,

wherein each subchannel has a subchannel bandwidth of approximately 20 MHz and comprises a plurality of orthogonal subcarriers, and

wherein the one or more spatial channels are non-orthogonal channels associated with one of the subchannels.

31. The communication station of claim 26 wherein each subchannel comprises a plurality of orthogonal subcarriers, and wherein the subcarriers of an associated subchannel have a null at substantially a center frequency of the other subcarriers to achieve substantial orthogonality between the subcarriers of the associated subchannel.